

Intensive Study Site for Monitoring, Measuring and Modeling Agricultural Field Dust Emissions

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Abstract

The Washington State University (WSU) USDA-ARS Conservation Unit in cooperation with the WSU Civil Engineering-Laboratory for Atmospheric Research has instrumented a large field in the Columbia Plateau (central Washington) to monitor and measure field dust emissions. The region contains soil types that predominantly consist of fine silt loams; over 90% (by weight) of the soil consist of particles that are smaller than 100 μm . During high wind events (HWE's), the soil structure and dryland farming practices leave tilled and fallow fields (i.e. no crops planted during the growing season) extremely susceptible to wind erosion and large emissions of PM₁₀ and smaller particles. As part of an air quality effort to quantify dust emissions, a 9-hectare section of a 300+ hectare field was instrumented and will be kept in continuous fallow over the next several years. Utility electrical power on-site will allow the operation of air quality instrumentation not previously used for agricultural dust emissions; this includes tapered element oscillating microbalance (TEOM) units, modified nephelometers (AQ-10's), high-volume air samplers, sonic anemometers, a modified relaxed eddy accumulation flux system, intensive meteorological measurements, and threshold velocity monitors. Primary objectives for the research are to improve current model parameters for dust emission models, quantify field turbulence structure and record continuous dust concentrations at several heights through short-time step interval measurements.